What is claimed is:

1. A method for installing a head stack assembly into a basedeck assembly to form a head disc assembly of a disc drive, comprising steps of:

(a) directing a robotic arm to pick and place the head stack assembly into the basedeck assembly;

(b) determining compliance of mechanical resistance encountered as the head stack assembly engages the basedeck in relation to installation force magnitude and rate of change of installation force magnitude, over time and position;

(c) seating the head stack assembly onto the basedeck assembly forming the head disc assembly, upon determining mechanical resistance and slope compliance; and

(d) releasing the head disc assembly from the head stack installation station.

2. The method of claim 1 in which steps (a) through (e) are executed and controlled by an installation software program having installation steps stored on a recordable medium.

3. The method of claim 2 in which the directing step (a) comprises:

(a1) compelling a central processing unit of a computer communicating with a head stack installation tool to read a volatile memory until both a head stack present signal and a basedeck present signal are read and reporting presence of the head stack assembly and the basedeck assembly to the installation software program;

(a2) acquiring and reporting a head stack assembly serial number and a head disc assembly serial number to the installation software program;

(a3) querying a head stack assembly data base for physical characteristics of the head stack assembly and a head disc assembly data base for physical characteristics of the head disc assembly; and

(a4) comparing the compatibility between the physical characteristics of the head disc assembly and the physical characteristics of the head stack

assembly.

4. The method of claim 3 wherein the physical characteristics of the head disc assembly and the physical characteristics of the head stack assembly are compatible, and in which the directing step (a) further comprises:

(a5) reading position data of a horizontal slide and a vertical slide;

(a6) directing alignment of an end effector assembly adjacent the head stack assembly based on the horizontal slide and the vertical slide position data;

(a7) enjoining radial displacement of radially disposed positionable gripper sections and lineal movement of a pair of opposing positionable flex connector grippers to engage a beveled pick and place member and a flex connector body of the head stack assembly;

(a8) measuring the radial displacement of the radially disposed positionable gripper sections with a potentiometer.

5. The method of claim 4 wherein the measurement of radial displacement of the radially disposed positionable gripper sections is consistent with the radially disposed positionable gripper sections engaging the beveled pick and place member of the head stack assembly, and in which the directing step (a) further comprises:

(a9) commanding removal of the head stack assembly from a nesting position of the head stack installation tool; and

(a10) directing alignment of the end effector assembly adjacent a head stack assembly post of the basedeck assembly.

6. The method of claim 2 in which the determining step (b) comprises:

(b1) enjoining engagement of a tolerance ring supported by a head stack assembly post of the basedeck assembly;

(b2) dispatching the robotic assembly to commence pressing the head stack assembly onto the tolerance ring;

(b3) compelling a linear variable differential transformer to measure the

distance traveled by the head stack assembly relative to the head stack assembly post and a load cell to measure an amount of mechanical resistance imparted on the head stack assembly; and

(b4) calculating the mechanical resistance encountered by the head stack assembly engaging the basedeck and the dynamic slope by dividing the difference in the measured distance travel between two points along the installation path into the difference in mechanical resistance encountered by the head stack assembly between the same two points during the same period of time.

7. The method of claim 6 wherein the installation force magnitude is a dynamic force threshold F derived from a relation ($F = f(p) +/- (x)$), where $f(p)$ is a profile of force as a function of position and $\dot{x}$ is a scalar value, the rate of change of installation force magnitude is a dynamic slope V determined by a slope derived from a relation $V = (f_n - f_{n-1})/(p_n - p_{n-1})$ at time ($t_{n-1}$ and $t_n$), where $f_n$ represents the mechanical resistance occurring at a point in time $t_n$ while at a position of engagement $p_n$ and $f_{n-1}$ represents the mechanical resistance occurring at a preceding point in time $t_{n-1}$ while at a preceding position of engagement $p_{n-1}$, and wherein the mechanical resistance encountered by the head stack assembly engaging the basedeck complies with the dynamic force threshold F and the dynamic slope V remaining compliant with predetermined values, in which the seating step (c) comprises:

(c1) continuing pressing the head stack assembly onto the tolerance ring monitoring the mechanical resistance remaining compliant and the slope exceeding a maximum predetermined value; and

(c2) seating the head stack assembly adjacent a base deck of the base deck assembly forming the head disc assembly.

8. The method of claim of claim 2 in which the releasing step (d) comprises:

(d1) verifying a radial displacement of radially disposed positionable gripper sections with a potentiometer confirming disengagement of the

radially disposed positionable gripper sections from the head stack assembly;

(d2) retracting the robotic assembly from communication with the head disc assembly; and

(d3) releasing the head disc assembly from the head stack installation tool.

9. The method of claim 3 wherein the computer further communicating with a display and wherein the physical characteristics of the head disc assembly and the physical characteristics of the head stack assembly are incompatible, the directing step (a) further comprises:

(a5a) displaying the occurrence of the incompatibility between the head stack assembly and the head disc assembly on the display; and

(a6a) aborting the installation process.

10. The method of claim 4 wherein the computer further communicating with a display and wherein the measurement of radial displacement of the radially disposed positionable gripper sections is inconsistent with the radially disposed positionable gripper sections engaging the beveled pick and place member of the head stack assembly, the measuring step (a) further comprises:

(a9a) directing the end effector assembly to move the radially disposed positionable gripper sections and the pair of opposing positionable flex connector grippers to disengage the beveled pick and place member and the flex connector body of the head stack assembly;

(a10a) measuring the radial displacement of the radially disposed positionable gripper sections with the potentiometer to confirm the radial displacement of the radially disposed positionable gripper sections as consistent with disengagement from the beveled pick and place member;

(a11a) commanding the robotic assembly to retract the end effector assembly from a nesting position;

(a12a) displaying the occurrence of the inconsistency between the

measurement of radial displacement of the radially disposed positionable gripper sections and engagement of the beveled pick and place member of the head stack assembly by the radially disposed positionable gripper sections on the display; and

(a13a) aborting the installation process.

11. The method of claim 10 wherein the installation force magnitude is a dynamic force threshold F derived from a relation (F = f(p) +/- (x)), where f(p) is a profile of force as a function of position and x is a scalar value, the rate of change of installation force magnitude is a dynamic slope V determined by a slope derived from a relation $V = (f_n - f_{n-1})/(p_n - p_{n-1})$ at time ($t_{n-1}$ and $t_n$), where $f_n$ represents the mechanical resistance occurring at a point in time $t_n$ while at a position of engagement $p_n$ and $f_{n-1}$ represents the mechanical resistance occurring at a preceding point in time $t_{n-1}$ while at a preceding position of engagement $p_{n-1}$ and wherein the mechanical resistance encountered by the head stack assembly engaging the basedeck is in non-compliance with the dynamic force threshold F and the dynamic slope V remaining compliant with predetermined values, in which the seating step (c) comprises:

(c1a) directing the robotic assembly to apply a tensile force on the head stack assembly to disengage the head stack assembly from the tolerance ring;

(c2a) compelling the robotic assembly to remove the head stack assembly from the head disc assembly and retract the end effector assembly from the basedeck assembly;

(c3a) reading position data of the horizontal slide and the vertical slide;

(c4a) dispatching the robotic assembly to align of the head stack assembly adjacent the nesting position;

(c5a) enjoining the end effector assembly to disengage the radially disposed positionable gripper sections from the beveled pick and place member of the head stack assembly;

(c6a) measuring the radial displacement of the radially disposed positionable gripper sections with the potentiometer;

(c7a) reading the measured displacement of the radially disposed positionable gripper sections to confirm disengagement of the radially disposed positionable gripper sections with the beveled pick and place member of the head stack assembly;

(c8a) commanding the robotic assembly to retract the end effector assembly from the nesting position;

(c9a) displaying the occurrence of the noncompliance of force to distance ratio with the predetermined values on the display; and

(c10a) aborting the installation process.

12. The method of claim 10 wherein the rate of change of installation force magnitude is a dynamic slope V determined by a slope derived from a relation $V = (f_n - f_{n-1})/(p_n - p_{n-1})$ at time ($t_{n-1}$ and $t_n$), where $f_n$ represents the mechanical resistance occurring at a point in time $t_n$ while at a position of engagement $p_n$ and $f_{n-1}$ represents the mechanical resistance occurring at a preceding point in time $t_{n-1}$ while at a preceding position of engagement $p_{n-1}$, and wherein the dynamic slope V determined by the equation $V = (f_n - f_{n-1})/(p_n - p_{n-1})$ lapses compliance with predetermined values, the seating step (c) further comprises:

(c1b) directing the robotic assembly to apply a tensile force on the head stack assembly to disengage the head stack assembly from the tolerance ring;

(c2b) compelling the robotic assembly to remove the head stack assembly from the head disc assembly and retract the end effector assembly from the basedeck assembly;

(c3b) reading position data of the horizontal slide and the vertical slide;

(c4b) dispatching the robotic assembly to align of the head stack assembly adjacent the nesting position;

(c5b) enjoining the end effector assembly to disengage the radially disposed positionable gripper sections from the beveled pick and place member of the head stack assembly;

(c6b) measuring the radial displacement of the radially disposed positionable gripper sections with the potentiometer;

(c7b) reading the measured displacement of the radially disposed positionable gripper sections to confirm disengagement of the radially disposed positionable gripper sections with the beveled pick and place member of the head stack assembly;

(c8b) commanding the robotic assembly to retract the end effector assembly from the nesting position;

(c9b) displaying the occurrence of the noncompliance of force to distance ratio with the predetermined values on the display; and

(c10b) aborting the installation process.

An installation software program having installation software program steps stored on recordable media directing and controlling a sequence of head stack installation process steps executed by a head stack assembly installation station installing a head stack assembly into a basedeck assembly forming a head disc assembly of a disc drive by steps comprising:

13. The method of claim 1 wherein the installation force magnitude is a dynamic force threshold F derived from a relation ($F = f(p) +/- (x)$), where $f(p)$ is a profile of force as a function of position and x is a scalar value.

14. The method of claim 1 wherein the rate of change of installation force magnitude is a dynamic slope V determined by a slope derived from a relation $V = (f_n - f_{n-1})/(p_n - p_{n-1})$ at time ($t_{n-1}$ and $t_n$), where $f_n$ represents the mechanical resistance occurring at a point in time $t_n$ while at a position of engagement $p_n$ and $f_{n-1}$ represents the mechanical resistance occurring at a preceding point in time $t_{n-1}$ while at a preceding position of engagement $p_{n-1}$.

15. The method of claim 13 wherein the rate of change of installation force magnitude is a dynamic slope V determined by a slope derived from a relation $V = (f_n - f_{n-1})/(p_n - p_{n-1})$ at time ($t_{n-1}$ and $t_n$), where $f_n$ represents the mechanical resistance occurring at a point in time $t_n$ while at a position of engagement $p_n$ and $f_{n-}$

$_1$ represents the mechanical resistance occurring at a preceding point in time $t_{n-1}$ while at a preceding position of engagement $p_{n-1}$.

16. The method of claim 15, in which the directing step (a) comprises:

(a1i) reading position data of a horizontal slide and a vertical slide;

(a2i) directing alignment of an end effector assembly adjacent the head stack assembly based on the horizontal slide and the vertical slide position data;

(a3i) enjoining radial displacement of radially disposed positionable gripper sections and lineal movement of a pair of opposing positionable flex connector grippers to engage a beveled pick and place member and a flex connector body of the head stack assembly;

17. The method of claim 16 in which the directing step (a) further comprises:

(a4i) removing of the head stack assembly from a nesting position of the head stack installation tool; and

(a5i) aligning of the end effector assembly adjacent a head stack assembly post of the basedeck assembly.

18. The method of claim 17 in which the determining step (b) comprises:

(b1i) engaging a tolerance ring supported by a head stack assembly post of the basedeck assembly;

(b2i) pressing the head stack assembly onto the tolerance ring using the robotic assembly;

(b3i) measuring the distance traveled by the head stack assembly relative to the head stack assembly post and a load cell to measure an amount of mechanical resistance imparted on the head stack assembly; and

(b4i) calculating the mechanical resistance encountered by the head stack assembly engaging the basedeck and the dynamic slope by dividing the difference in the measured distance travel between two points

along the installation path into the difference in mechanical resistance encountered by the head stack assembly between the same two points during the same period of time.

19. The method of claim 18 wherein the mechanical resistance encountered by the head stack assembly engaging the basedeck complies with the dynamic force threshold F and the dynamic slope V remaining compliant with predetermined values, in which the seating step (c) comprises:

(c1) continuing pressing the head stack assembly onto the tolerance ring monitoring the mechanical resistance remaining compliant and the slope exceeding a maximum predetermined value; and

(c2) seating the head stack assembly adjacent a base deck of the base deck assembly forming the head disc assembly.

20. A disc drive comprising:

a head disc assembly with a head stack assembly; and

means for installing the head stack assembly into the head disc assembly.